Amendments to the Specification

Please replace the paragraph on page 2, line 26 and bridging to page 3, line 2 with the following:

The present invention relates to a reactor module for use with a compact fuel processor. [[processor .]] A reactor module consistent with the present invention consists essentially of a spiral heat exchanger with a fixed bed reactor located in the core of the spiral heat exchanger. Hot reactor product gas spirals outward toward the outside channel, while the module feed enters the module at the outside channel and spirals towards the core. Countercurrent flow is thus employed between to maximize heat transfer, reduce pressure drop, and create an optimal compact modular design consistent with a compact fuel processor.

Please replace the paragraph on page 8, lines 7-12 with the following:

Process step F' [[F]] is a cooling step performed in one embodiment by a heat exchanger. The heat exchanger can be of any suitable construction including shell and tube, plate, spiral, etc. Alternatively a heat pipe or other form of heat sink may be utilized. The goal of the heat exchanger is to reduce the temperature of the gas stream to produce an effluent having a temperature preferably in the range of from about 90° C. to about 150° C.

Please replace the paragraph on page 8, lines 13-17 with the following:

Oxygen is added to the process in step F' [[F]]. The oxygen is consumed by the reactions of process step G described below. The oxygen can be in the form of air, enriched air, or substantially pure oxygen. The heat exchanger may by design provide mixing of the air with the hydrogen rich gas. Alternatively, the embodiment of process step D may be used to perform the mixing.

Please replace the paragraph on page 9, lines 13-18 with the following:

The effluent P exiting the fuel processor is a hydrogen rich gas containing carbon dioxide and other constituents which may be present such as water, inert components (e.g., nitrogen, argon), residual hydrocarbon, etc. Product gas P may be used as the feed for a fuel cell or for other applications where a hydrogen

rich feed stream is desired. Optionally, product gas may be sent on to further processing, for example, to remove the carbon dioxide, water or other components.

Please replace the paragraph on page 10, lines 12-30 with the following:

Compact fuel processor 100 as shown in FIG. 2 effects the process diagrammatically illustrated in FIG. 1. Feed stream F is introduced through inlet pipe 102 and product gas P is drawn off via outlet pipe 103. Compact fuel processor 100 includes several modules that may be stacked to form a modular assembly that can be modified by the replacement of individual modules. Each module performs a separate operational function and is generally configured as shown in FIG. 2. Module 110 is the autothermal reforming module corresponding to process step A of FIG. 1. Module 120 is a cooling step corresponding to process step B of FIG. 1. In this illustrative embodiment, heat exchanger 121 is shown as a general heat sink for module ~~Module~~ 120. Module 130 is a purifying module corresponding to process step C of FIG. 1. Module 140 is a mixing step corresponding to process step D of FIG. 1. Feed nozzle 131 provides an optional water stream feed to module ~~Module~~ 140 to aid in driving the water gas shift reaction (Equation IV) of module ~~Module~~ 150. Module 150 is a water gas shift module corresponding to process step E of FIG. 1. Feed nozzle 151 provides a source for oxygen to process gas for the oxidation reaction (Equation V) of module ~~Module~~ 170. In this compact fuel processor, heat exchanger 152 is shown as a general heat sink for module ~~Module~~ 150. Module 160 is a cooling step corresponding to process step F' [[F]] of FIG. 1. In this compact fuel processor, heat exchanger 161 is shown as a general heat sink for module ~~Module~~ 160. Module 170 is an oxidation step corresponding to process step G of FIG. 1.

Please replace the paragraph on page 12, lines 16-30, with the following:

Such a skilled person in the art should also appreciate that the present invention encompasses the following illustrative embodiments. One such illustrative embodiment includes a reactor module for use in a compact fuel processor having both a reactor and a heat integrating heat exchanger contained

in the same module. In this embodiment, the module feed stream is introduced to the module inlet and is preheated in the heat exchanger against the hot reactor product prior to being introduced to the reactor inlet. A cooled module effluent is then produced from the module outlet for further processing in the fuel processor. The reactor may be any type of exothermic reactor as previously described, including <u>but</u> ~~by~~ not limited to an autothermal reforming reactor as in <u>process step</u> ~~Process Step~~ A of FIG. 1, a desulfurization reactor as in <u>process step</u> ~~Process Step~~ C of FIG. 1, a water gas shift reactor as in <u>process step</u> ~~Process Step~~ E of FIG. 1, or an oxidation reactor as in process <u>step</u> ~~Step~~ G of FIG. 1. The reactor may be a fixed bed reactor containing supported catalyst particles or the reactor bed may be a monolith with catalytic material coated on to the surface of the structural members, the choice of catalyst being a design decision consistent with the previous discussions regarding the <u>process steps</u> ~~Process Steps~~ of FIG. 1 supra.

Please replace the paragraph on page 13, lines 1-19, with the following:

Another illustrative embodiment of the present invention is a reactor module for use in a compact fuel processor having a module inlet for receiving a feed stream, a module outlet for producing an effluent stream, a reactor having a reactor inlet, a reactor outlet, and catalyst, an inlet spiral passage in fluid communication with the module inlet to the reactor inlet, and an outlet spiral passage in fluid communication with the reactor outlet to the module outlet. Such a design provides for the feed stream to be introduced to the module inlet, where it then passes through the inlet spiral passage, and is heated by hot reactor product passing through the outlet spiral passage. The reactor may be any type of exothermic reactor as previously described, including by not limited to an autothermal reforming reactor as in process step A of FIG. 1, a desulfurization reactor as in process step C of FIG. 1, a water gas shift reactor as in process step E of FIG. 1, or an oxidation reactor as in process step G of FIG. 1. The reactor may be a fixed bed reactor containing supported catalyst particles or the reactor bed may be a monolith with catalytic material coated on to the surface of the structural members, the choice of catalyst being a design decision consistent with the previous discussions regarding the <u>process steps</u> ~~Process Steps~~ of FIG.

1 supra. Furthermore, a flow distribution manifold can be connected to the reactor inlet for evenly distributing flow into the reactor. Likewise, a flow collection manifold can be connected to the reactor for directing the hot reactor product to the reactor outlet.